



DEPARTMENT OF THE ARMY
OFFICE OF THE SURGEON GENERAL
5109 LEESBURG PIKE
FALLS CHURCH, VA 22041-3258

REPLY TO
ATTENTION OF
DASG-PPM-NC

17 DEC 2001

MEMORANDUM FOR Commanders, MEDCOM Major Subordinate Commands

SUBJECT: Cold Weather Injury (CWI) Prevention

1. Despite recent climatic changes resulting in milder average temperatures, extremely cold temperatures persist in many parts of the world and continue as a major threat to soldiers. Both in training and during operations, cold weather can have a serious impact on individual health and unit performance. Historically, cold weather injuries have accounted for more than 10% of all casualties during conflicts conducted in cold weather environments. More importantly, only 15% of those affected were able to return to the battlefield. Because soldiers routinely train and serve in environments in which serious cold weather injuries may occur, the Army must maintain vigilance in preventing their occurrence.
2. The protection of soldiers against cold weather injuries is a command responsibility. Army Medical Department personnel must assist commanders in defining risks, developing sound plans and programs, and assuring these are consistently implemented. Unit surgeons, preventive medicine sections, and all medical personnel serving in an advisory capacity to Army units must take a proactive role in assuring that our leaders know about and support efforts to prevent cold weather injuries. Information on the "Cold Weather Injury Prevention Program" is provided as an enclosure to assist you in this process. This document includes several appendices, including information on CWI occurrence in soldiers during the previous winter season (Appendix 2) and guidance on physical training recommendations during cold weather conditions (Appendix 5).
3. A new Wind Chill Temperature index has been developed by several weather-related agencies in North America. The new index was developed in response to widespread recognition of the inaccuracy of existing wind chill charts, which tend to overestimate the effect of wind. The new index has been adopted for use during the 2001-2002 winter season by a number of meteorological organizations including the National Weather Service and the US Air Force Weather Agency. As a result, the new wind chill chart will be used by weather-monitoring activities on military installations worldwide. The U.S. Army Research Institute for Environmental Medicine has incorporated the new wind chill temperature chart into an updated Technical Note - "Sustaining Health and Performance In Cold Weather Operations," October 2001. An excerpt of the new wind chill temperature chart and guidance related to its use is included as Appendix 3 in the enclosure.


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4. Our points of contact are COL Jeffrey D. Gunzenhauser, Proponency Office for Preventive Medicine, Office of the Surgeon General, DSN 761-3160, Commercial (703) 681-3160, or e-mail Jeffrey.Gunzenhauser@otsg.amedd.army.mil, and LTC Mark A. Lovell, U.S. Army Center for Health Promotion and Preventive Medicine, DSN 584-2464, Commercial (410) 436-2464, or e-mail Mark.Lovell@apg.amedd.army.mil.

FOR THE SURGEON GENERAL:

Encl


LESTER MARTINEZ-LOPEZ
Brigadier General, MC
Functional Proponent
for Preventive Medicine

CF (w/encl):

Commander, 18th MEDCOM, ATTN: Surgeon

Director, National Guard Bureau, ATTN: Surgeon, 111 South George
Mason, Arlington, VA 22204-1382

Chief, U.S. Army Reserve Command, ATTN: Surgeon, 1401 Deshler
Street South West, Fort McPherson, GA 30330-2000

Commander, U.S. Army Training and Doctrine Command,
ATTN: Surgeon, 7 Fenwick Road, Fort Monroe, VA 23651-5000

Commander, U.S. Army Forces Command, ATTN: Surgeon, 1777 Hardee
Avenue, SW, Fort McPherson, GA 30330-6000

Commander, U.S. Army Materiel Command, ATTN: Surgeon,
5001 Eisenhower Avenue, Alexandria, VA 22333-0001

Commander, U.S. Army Test and Evaluation Command, Park Center
IV, 4501 Ford Avenue, Alexandria, VA 22301-1458

Commander, U.S. Army Special Operations Command, ATTN: Surgeon,
Fort Bragg, NC 28307-5200

Information
Cold Weather Injury Prevention Program

1. References:

- a. Memorandum, HQDA, SGPS-PSP, 19 Apr 94, subject: Implementation of New Medical Surveillance System. <http://amsa.army.mil/documents/otsg_memo.pdf>
- b. Memorandum, HQDA, MCHO-CL-W, 17 Jun 98, subject: Tri-Service Reportable Events List. <http://amsa.army.mil/documents/medcom_memo.pdf>
- c. Tri-Service Reportable Events - Guidelines & Case Definitions, paragraph 4.12, Cold Weather Injuries. <<http://amsa.army.mil/TriServiceRE/Jul98TriServREGuide.pdf>>
- d. Army Regulation 40-5, 15 Oct 90, Preventive Medicine.
- e. U.S. Army Environmental Hygiene Agency Technical Guide 172, Dec 89, Cold Injury.
- f. Field Manual 21-10, 21 Jun 00 Hygiene and Sanitation.
<<http://www.adtdl.army.mil/cgi-bin/atdl.dll/fm/21-10/fm21-10.htm>.>
- g. Field Manual 21-11, 27 Oct 88 First Aid For Soldiers.
<<http://www.adtdl.army.mil/cgi-bin/atdl.dll/fm/21-11/fm2111.htm>.>
- h. USARIEM Technical Note, October 2001, Sustaining Health & Performance In Cold Weather Operations.
- i. USARIEM Technical Note 93-4, Medical Aspects of Cold Weather Operations: A Handbook for Medical Officers.
<<http://www.usariem.army.mil/download/worddocs/weather.doc>>

2. A comprehensive cold weather injury prevention program ensures that all personnel, upon completion of training, will:

- a. Recognize the cold weather threat that frequently reduces manpower and degrades performance.
- b. Know conditions which are risk factors for cold weather injuries, e.g., weather, duration of exposure, clothing, etc., and know the appropriate preventive steps to take to reduce risk.
- c. Know the types of cold weather injuries and their causative factors; be able to recognize and evaluate cold weather injuries early; and be able to provide proper first-aid and know when to seek additional medical care.

3. In accordance with references 1.a.-c. above, medical treatment facilities (MTFs) are required to report all cases of cold weather injury to the Army Medical Surveillance Activity as part of the Reportable Medical Events System (RMES). Preventive Medicine personnel at the MTF should receive local reports of possible cold weather injuries, investigate and compile required information, and report the injuries electronically to the RMES. Cold weather injuries should be categorized locally as frostbite, hypothermia, immersion type (chilblains, trench foot), or unspecified (any cold weather injury which does not fit the other categories). Appendix 1 provides information extracted directly from "Triservice Reportable Events - Guidelines and Case Definitions" (July 1998) and should be used as a guide in reporting Cold Weather Injuries.

4. Cold Weather Injuries which occurred during the previous winter season are summarized in the figure at Appendix 2. This diagram was created by the Army Medical Surveillance Activity and portrays the overlapping distributions of cold weather injury reportable events, hospitalizations, and ambulatory data that occurred during the previous winter season. This diagram demonstrates the variability in the number of cold weather injuries which are reported by the different systems. This emphasizes the need for Preventive Medicine personnel to monitor a variety of local medical information sources to assure that all possible cases of Cold Weather Injury are identified, investigated, and reported.

5. Commanders must perform a risk assessment prior to conducting training or other military operations during periods of cold weather. Medical personnel should assist in this process. Appendix 3 provides "Cold Weather Training Guidance" and includes an excerpt of a new Wind Chill Temperature Chart recently adopted by the Air Force Weather Agency for use at military installations worldwide. The new chart identifies three "danger" zones. An accompanying table on the "Time to occurrence to frostbite" should be useful in interpretation and application of the revised chart. In addition, this section contains summary recommendations on training guidance and uniform wear which correspond to the three "danger" zones. Additional information on the revised Wind Chill Chart is available in a USARIEM Technical Note titled, "SUSTAINING HEALTH & PERFORMANCE IN COLD WEATHER OPERATIONS," dated October 2001. Appendix 4 supplements Appendix 3 by providing general guidance that should be used when planning for physical fitness training in cold weather environments.

Appendices

1. Cold Weather Injury Case Definitions (for RMES reporting)
2. Cold Weather Injury Cases, CY 00-01, AMSA
3. Cold Weather Training Guidance (includes new Wind Chill Temperature Table)
4. General Guidance for Cold-Weather Physical Fitness Training (PT)

COLD WEATHER INJURIES - Clinical Description and Case Definitions

ICD-9: **991.3 (Frostbite)**
 991.4 (Immersion Type)
 991.6 (Hypothermia)
 991.9 (Unspecified)

INCLUDES: Service Member cases only.

Clinical Description

1. **Cold/Wet Injuries:** Localized non-freezing injuries, usually of extremities. Includes, in increasing order of severity, chilblains, pernio and trench foot. May occur in temperatures as high as 60° F with prolonged exposure.
2. **Cold/Dry Injuries:** Frostbite is the most common of these injuries. It results from the actual crystallization of tissue fluids in the skin or subcutaneous tissues after exposure to temperatures below freezing.
3. **Hypothermia:** The result of a generalized lowering of core body temperature to below 95° F. It can result from either dry-land whole body exposure or immersion in cold water. Freezing temperatures are not required to produce hypothermia.

Clinical Case Definition

Frostbite:

- **1st degree:** Superficial epidermal injury. Mobility unaffected, no blistering. Complete healing in 7-10 days; residual cold sensitivity is may occur.
- **2nd degree:** Involves the entire epidermis; forms bulla after thawing. Heals in 3-4 weeks; residual cold sensitivity may occur.
- **3rd degree:** Involves the dermis at least to the reticular layer. When frozen, mobility is limited. Characterized by hemorrhagic bullae and swelling. Permanent tissue loss may occur.
- **4th degree:** Full skin thickness and underlying tissue damage. No mobility of the frozen tissue; mobility not recovered with thawing. No bullae or edema, but necrotic changes occur rather early. Significant permanent damage is typical.

Hypothermia: Body core temperature below 95° F, unless the hypothermia is the result of immersion.

Immersion Type: Chilblains, pernio, trench foot or whole body immersion resulting in hypothermia.

Unspecified: Any cold weather injury (CWI) that does not fit the above categories.

Laboratory Criteria for Diagnosis

None. Cold injuries are diagnosed clinically.

Case Classification

Confirmed: A clinically compatible case with an appropriate history of cold exposure.

Required Comments:

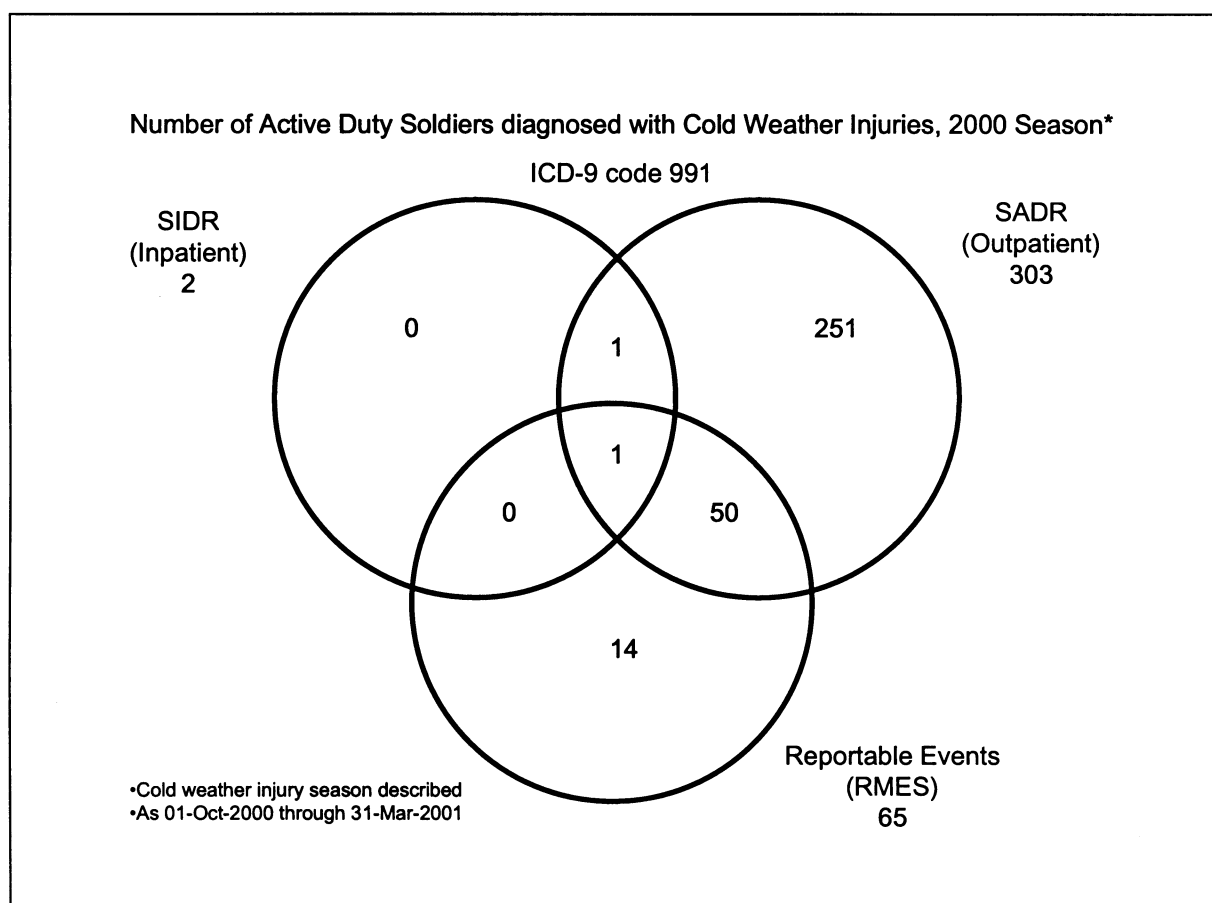
Note if injury was duty related.

Additional Considerations

Document the anatomic location of injury, degree of frostbite, core body temperature (for hypothermia), and any unusual circumstances.

Army Medical Surveillance Activity (AMSA) Cold Weather Injury Data

1. The number of AD soldiers diagnosed with CWI during the CWI Season (1-OCT-2000 to 31-MAR-2001) is demonstrated in the graphic below.
2. Please note that the SADR data is not considered accurate. Most of the SADR diagnoses are based on a "clinical impression" of various quality, and the case definition may not be available to the clinician at the TMC or BAS as well at the hospital.
3. Also note that any diagnosis within the 991 category of ICD-9 was accepted for both SADR and SIDR data where as RMES uses only the ICD-9 codes of 991.3, 991.4, 991.6, 991.9.



COLD WEATHER TRAINING GUIDANCE*

Wind Chill Temperature Table

Wind Speed (mph) ↓	Air Temperature (°F)																	
	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
5	36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63
10	34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72
15	32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77
20	30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81
25	29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84
30	28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87
35	28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89
40	27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91
45	26	19	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
50	26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95

RISK OF FROSTBITE (see times on chart below)

- GREEN LITTLE DANGER (frostbite occurs in >2 hours in dry, exposed skin)
 YELLOW INCREASED DANGER (frostbite could occur in 45 minutes or less in dry, exposed skin)
 RED GREAT DANGER (frostbite could occur in 5 minutes or less in dry, exposed skin)

Time to occurrence of frostbite in minutes or hours (In the most susceptible 5% of personnel.)

Wind Speed (mph) ↓	Air Temperature (°F)											
	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
5	>2h	>2h	>2h	>2h	31	22	17	14	12	11	9	8
10	>2h	>2h	>2h	28	19	15	12	10	9	7	7	6
15	>2h	>2h	33	20	15	12	9	8	7	6	5	4
20	>2h	>2h	23	16	12	9	8	8	6	5	4	4
25	>2h	42	19	13	10	8	7	6	5	4	4	3
30	>2h	28	16	12	9	7	6	5	4	4	3	3
35	>2h	23	14	10	8	6	5	4	4	3	3	2
40	>2h	20	13	9	7	6	5	4	3	3	2	2
45	>2h	18	12	8	7	5	4	4	3	3	2	2
50	>2h	16	11	8	6	5	4	3	3	2	2	2

WET SKIN COULD SIGNIFICANTLY DECREASE THE TIME FOR FROSTBITE TO OCCUR.

*Source: USARIEM Technical Note "SUSTAINING HEALTH & PERFORMANCE IN COLD WEATHER OPERATIONS," October 2001

COLD WEATHER TRAINING GUIDANCE*

Wind Chill Category

(see Wind Chill Temperature Table)

<u>Work Intensity</u>	Little Danger	Increased Danger	Great Danger
High Digging foxhole, running, marching with rucksack, making or breaking bivouac	Increased surveillance by small unit leaders; Black gloves optional - mandatory below 0°F (-18°C);	ECWCS or equivalent; Mittens with liners; No facial camouflage; Exposed skin covered and kept dry; Rest in warm, sheltered area; Vapor barrier boots below 0°F (-18°C) Provide warming facilities	Postpone non-essential training; Essential tasks only with <15 minute exposure; Work groups of no less than 2; Cover all exposed skin, Provide warming facilities
Low Walking, marching without rucksack, drill and ceremony	Increased surveillance; Cover exposed flesh when possible; Mittens with liner and no facial camouflage below 10°F (-12°C); Full head cover below 0°F (-18°C). Keep skin dry - especially around nose and mouth.	Restrict Non-essential training; 30-40 minute work cycles with frequent supervisory surveillance for essential tasks. See above.	Cancel Outdoor Training
Sedentary Sentry duty, eating, resting, sleeping, clerical work	See above; Full head cover and no facial camouflage below 10°F (-12°C); Cold-weather boots (VB) below 0°F (-18°C); Shorten duty cycles; Provide warming facilities	Postpone non-essential training; 15-20 minute work cycles for essential tasks; Work groups of no less than 2 personnel; No exposed skin	Cancel Outdoor Training

These guidelines are generalized for worldwide use. Commanders of units with extensive extreme cold-weather training and specialized equipment may opt to use less conservative guidelines.

General Guidance for all Cold-Weather Training

- Skin:** Exposed skin is more likely to develop frostbite, therefore cover skin. Avoid wet skin (common around the nose and mouth). Inspect hands, feet, face and ears frequently for signs of frostbite.
- Clothing:** Soldiers must change into dry clothing at least daily and whenever clothing becomes wet, and must wash and dry feet and put on dry socks at least twice daily.
- Nutrition:** 4500 calories/day/soldier. Equivalent to 3 meal packets in meal-cold weather (MCW) or 3-4 MRE's.
- Hydration:** 3-6 Liters (canteens)/day/soldier. Warm, sweet drinks are useful for re-warming.
- Camouflage:** Obscures detection of cold injuries; Not recommended below 10°F.
- Responsibilities:** Soldiers are responsible for preventing individual cold injuries. Unit NCO's are responsible for the health and safety of their troops. **Cold injury prevention is a command responsibility**

*Source: USARIEM Technical Note "SUSTAINING HEALTH & PERFORMANCE IN COLD WEATHER OPERATIONS," October 2001

General Guidance for all Cold-Weather Physical Fitness Training (PT)

1. Responsibilities: Cold Weather Injury prevention is a command responsibility. Unit non-commissioned officers are responsible for the health and safety of their troops and must set the example in how to conduct PT in the cold. Soldiers are responsible for preventing individual cold injuries.
2. PT can be conducted during inclement weather. Exceptions are that PT should not be conducted when there is:
 - a. extensive ice on roads, which can cause the potential risk for significant injury
 - b. extremely heavy rain which can reduce visibility to dangerous levels.
 - c. PT can always be conducted indoors in the above conditions
3. PT at or below 0 °F ambient air temperature or 0 °F wind chill should be considered high-risk training. Unit commander must be advised to conduct risk assessment for training under these conditions.
4. Unit commander should be advised of specific additions to the standard PT uniform (e.g., black stocking cap, gloves, balaclava, neck gaiters, etc.) based on the weather requirements.
 - a. First-line leaders must carefully monitor individual uniform modifications in extreme weather.
 - b. During cold weather the Army gray sweat suit will be worn. Soldiers traveling to PT should be allowed extra clothing, such as the cold weather parka (Gortex jacket) as an outer garment.
 - c. Minimum cold weather PT uniform guidance should correspond to the wind chill categories as below:

COLD WEATHER RISK	PT UNIFORM GUIDANCE
LITTLE DANGER	PFU, sweat top and bottom, black knit cap, black gloves with inserts, neck gaiter.
INCREASING DANGER	PFU, sweat top and bottom, polypropylene top and bottom, balaclava, trigger finger mittens.
GREAT DANGER	Add ECW Mittens, parka.

- d. After physical fitness training appropriate warming and changing facilities need to be provided. Individuals need to change into dry clothing as soon as possible. Fluid losses need to be replenished, preferable with warm, sweet non-caffeinated drinks.